

## FLIGHT SUMMARY REPORT

**Flight Number:** 99-134  
**Calendar/Julian Date:** 24 September 1999 • 267  
**Sensor Package:** Wild Heerbrugg RC-10  
Airborne Visible and Infrared Imaging  
Spectrometer (AVIRIS)  
Thematic Mapper Simulator (TMS)  
**Area(s) Covered:** Rogers Dry Lake/Salinas/San Joaquin  
Valley, CA

**Investigator(s):** Green, JPL; Johnson, CSU Monterey;  
Gat, NASA-SSC

**Aircraft #:** 806

### SENSOR DATA

<b>Accession #:</b>	05400	-----	-----
<b>Sensor ID #:</b>	034	099	074
<b>Sensor Type:</b>	RC-10	AVIRIS	TMS
<b>Focal Length:</b>	12" 304.66 mm	-----	-----
<b>Film Type:</b>	Aerochrome IR SO-134	-----	-----
<b>Filtration:</b>	Wratten 12	-----	-----
<b>Spectral Band:</b>	510-900nm	-----	-----
<b>f Stop:</b>	11	-----	-----
<b>Shutter Speed:</b>	1/275	-----	-----
<b># of Frames:</b>	115	-----	-----
<b>% Overlap:</b>	60	-----	-----
<b>Quality:</b>	Excellent	-----	Good
<b>Remarks:</b>	Add 12 seconds for correct UTC		

## **Airborne Science Program**

The Airborne Science Program at NASA's Dryden Flight Research Center, Edwards, California, operates two ER-2 high altitude aircraft in support of NASA earth science research. The ER-2s are used as readily deployable high altitude sensor platforms to collect remote sensing and in situ data on earth resources, celestial phenomena, atmospheric dynamics, and oceanic processes. Additionally, these aircraft are used for electronic sensor research and development and satellite investigative support.

The ER-2s are flown from various deployment sites in support of scientific research sponsored by NASA and other federal, state, university, and industry investigators. Data are collected from deployment sites in Kansas, Texas, Virginia, Florida, and Alaska. Cooperative international scientific projects have deployed the aircraft to sites in Great Britain, Australia, Chile, and Norway.

Photographic and digital imaging sensors are flown aboard the ER-2s in support of research objectives defined by the sponsoring investigators. High resolution mapping cameras and digital multispectral imaging sensors are utilized in a variety of configurations in the ER-2s' four pressurized experiment compartments. The following provides a description of the digital multispectral sensor(s) and camera(s) used for data collection during this flight.

## **Airborne Visible and Infrared Imaging Spectrometer**

The Airborne Visible and Infrared Imaging Spectrometer (AVIRIS) is the second in the series of imaging spectrometer instruments developed at the Jet Propulsion Laboratory (JPL) for earth remote sensing. This instrument uses scanning optics and four spectrometers to image a 614-pixel swath simultaneously in 224 contiguous spectral bands (0.4-2.4  $\mu\text{m}$ ).

AVIRIS parameters are as follows:

IFOV:	1 mrad
Ground Resolution:	66 feet (20 meters) at 65,000 feet
Total Scan Angle:	30°
Swath Width:	5.7 nmi (10.6 km) at 65,000 feet
Spectral Coverage:	0.41-2.45 $\mu\text{m}$
Pixels/Scan Line:	614
Number of Spectral Bands:	224
Digitization:	10-bits
Data Rate:	17 MBPS

<u>Spectrometer</u>	<u>Wavelength Range</u>	<u>Number of Bands</u>	<u>Sampling Interval</u>
1	0.41 - 0.70 $\mu\text{m}$	31	9.4 nm
2	0.68 - 1.27 $\mu\text{m}$	63	9.4 nm
3	1.25 - 1.86 $\mu\text{m}$	63	9.7 nm
4	1.84 - 2.45 $\mu\text{m}$	63	9.7 nm

All AVIRIS data is decommutated and archived at JPL and not currently available for public distribution. For further information contact Rob Green at Jet Propulsion Laboratory, 4800 Oak Grove Drive, Mail Stop 183-501, Pasadena, California 91109-8099.

## **Camera Systems**

Various camera systems and films are used for photographic data collection. Film types include high definition color infrared, natural color, and black and white emulsions. Available photographic systems are as follows:

- Wild-Heerbrugg RC-10 metric mapping camera
  - 9 x 9 inch film format
  - 6 inch focal length lens provides area coverage of 16 x 16 nautical miles from 65,000 feet
  - 12 inch focal length lens provides area coverage of 8 x 8 nautical miles from 65,000 feet
- Hycon HR-732 large scale mapping camera
  - 9 x 18 inch film format
  - 24 inch focal length lens provides area coverage of 4 x 8 nautical miles from 65,000 feet
- IRIS II Panoramic camera
  - 4.5 x 34.7 inch film format
  - 24 inch focal length lens
  - 90 degree field of view provides area coverage of 2 x 21.4 nautical miles from 65,000 feet

## **Thematic Mapper Simulator**

The Daedalus Thematic Mapper Simulator (TMS) is a multispectral scanner flown aboard the ER-2 aircraft which simulates spatial and spectral characteristics of the seven Landsat-D Thematic Mapper bands. The specific bands are as follows:

<u>Daedalus Channel</u>	<u>TM Band</u>	<u>Wavelength, <math>\mu\text{m}</math></u>
1	A	0.42 - 0.45
2	1	0.45 - 0.52
3	2	0.52 - 0.60
4	B	0.60 - 0.62
5	3	0.63 - 0.69
6	C	0.69 - 0.75
7	4	0.76 - 0.90
8	D	0.91 - 1.05
9	5	1.55 - 1.75
10	7	2.08 - 2.35
11	6	8.5 - 14.0 low gain
12	6	8.5 - 14.0 high gain

Sensor/aircraft parameters are as follows:

IFOV:	1.25 mrad
Ground Resolution:	81 feet (25 meters) at 65,000 feet
Total Scan Angle:	43°
Swath Width:	8.4 nmi (15.6 km) at 65,000 feet
Pixels/Scan Line:	716
Scan Rate:	12.5 scans/second
Ground Speed:	400 kts (206 m/second)

### **Data Availability**

The U.S. Geological Survey's EROS Data Center at Sioux Falls, South Dakota serves as the archive and product distribution facility for Airborne Science Program aircraft acquired photographic and digital imagery. The photographic archive consists of photography acquired by the program from 1971 to April 1996. For information regarding photography and digital data (including areas of coverage, products, and product costs) contact EROS Data Center, Customer Services, Sioux Falls, South Dakota 57198 (Telephone: 605.594.6151).

As of April 1996 the EROS Data Center no longer receives an archive copy of newly acquired Airborne Science Program photography. Original photography is archived with the Airborne Sensor Facility at Ames Research Center. A user copy of the photography is provided to the principal investigators for each flight. Principal investigators are cited on the first page of their respective flight summary reports. For information regarding photography acquired from April 1996 to the present contact the Airborne Sensor Facility as follows:

### **Flight Documentation and Data Archive Searches**

The following is the web site for flight documentation as published by the Airborne Sensor Facility at NASA Ames Research Center: <http://asapdata.arc.nasa.gov/er-2fsr.html>

Additional information regarding flight documentation to include data archive searches, data availability, sensor parameters, and areas of coverage may be obtained from the following: Airborne Sensor Facility, MS 240-6, NASA Ames Research Center, Moffett Field, CA 94035-1000, Telephone: 650.604.6252 (FAX 650.604.4987).

# CAMERA FLIGHT LINE DATA

## FLIGHT NO. 99-134

Accession # 05400

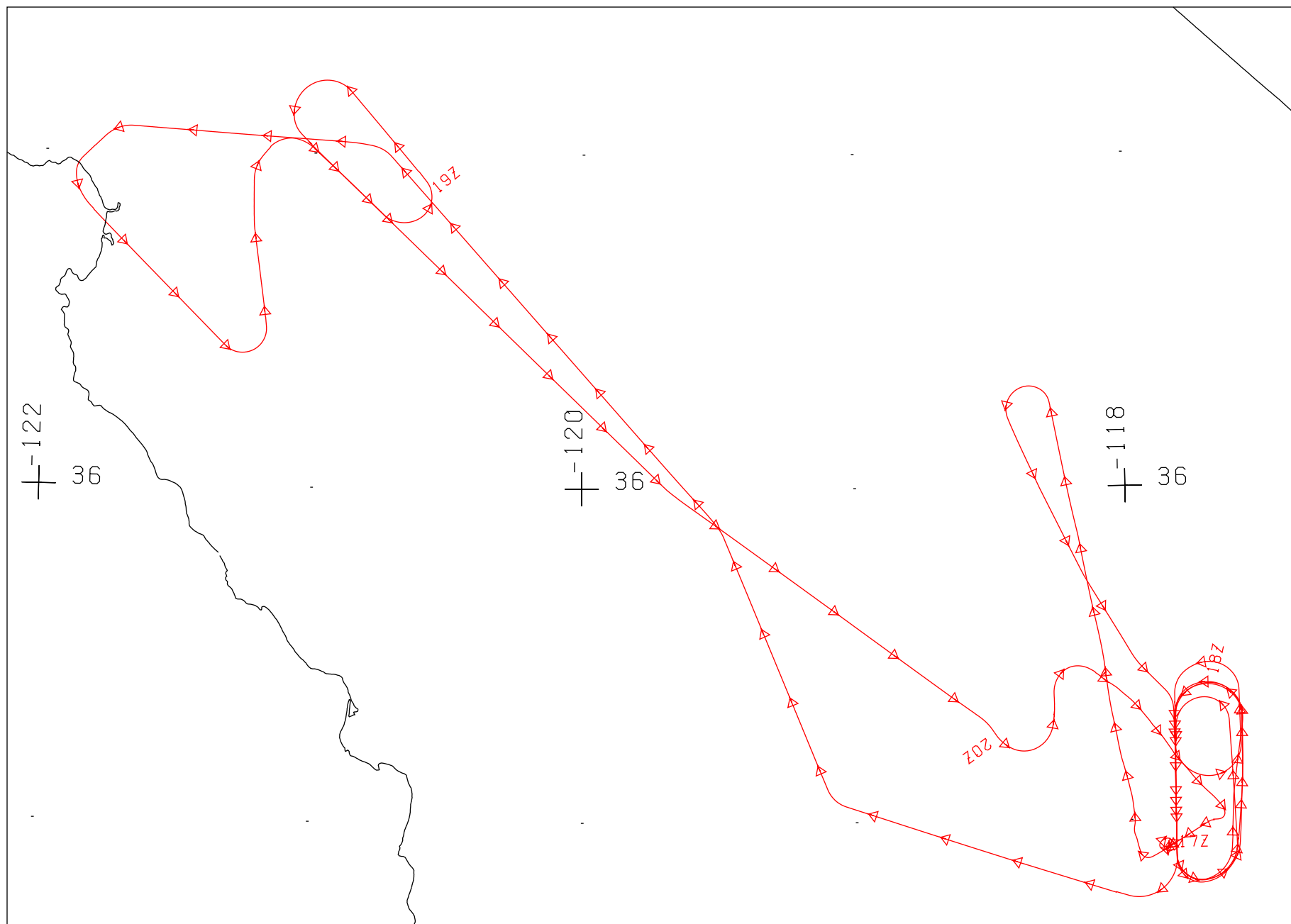
Sensor # 034

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
A - B	3166-3172	17:38:00	17:40:52	66000/20117	Clear
A - B	3173-3178	17:49:58	17:52:20	65000/19812	Clear
A - B	3179-3184	18:02:26	18:04:46	65000/19812	Clear; emulsion tear (frame 3180)
A - B	3185-3190	18:14:45	18:17:05	65000/19812	Clear
A - B	3191-3197	18:27:22	18:29:46	65500/19964	Clear
G - H	3198-3209	18:40:40	18:45:23	66000/20117	Clear
I - J	3210-3235	18:49:40	19:00:54	66000/20117	Clear
M - N	3236-3247	19:11:36	19:16:19	65000/19812	30-100% stratus (frames 3236-3240); 10% stratus (frame 3241)
Q - R	3248-3251	19:25:59	19:26:59	65000/19812	Clear
Q - U	3252-3280	19:35:42	19:48:06	65000/19812	Clear

DAEDALUS FLIGHT DATA  
FLIGHT NUMBER: 99-134

Check Points	A c t u a l t i m e (GMT) b e g i n e n d		A c t u a l s c a n l i n e b e g i n e n d		Altitude feet/meter	ground s p e e d knots/mps	Scan Speed (rps)	total G o o d scanlines	total Interpolated scanlines	total Repeated scanlines
A-B	17:37:22.0	17:41:07.0	35131	37939	66194/20176	426/214	12.50	2809	0	0
C-D	17:44:15.0	17:47:06.0	40284	42426	65536/19975	405/203	12.50	2143	0	0
A-B	17:49:42.0	17:52:42.0	44374	46624	65356/19921	427/214	12.50	2251	0	0
E-D	17:56:46.0	17:58:32.0	49675	51007	65111/19846	399/200	12.50	1333	0	0
A-B	18:01:57.0	18:05:07.0	53558	55943	65112/19846	428/215	12.50	2386	0	0
C-E	18:08:16.0	18:09:54.0	58302	59526	65223/19880	405/203	12.50	1225	0	0
A-B	18:14:37.0	18:17:37.0	63061	65311	65254/19889	428/215	12.50	2251	0	0
C-E	18:20:36.0	18:21:51.0	67547	68483	65670/20016	404/203	12.50	937	0	0
E-D	18:22:14.0	18:23:47.0	68780	69941	65772/20047	406/204	12.50	1162	0	0
A-B	18:26:58.0	18:30:17.0	72328	74812	65489/19961	424/213	12.50	2485	0	0
F-G	18:32:35.0	18:39:52.0	76539	82002	65977/20110	425/213	12.50	5464	0	0
G-I	18:40:47.0	18:47:55.0	82689	88035	66224/20185	415/208	12.50	5347	0	0
I-J	18:48:49.0	19:01:31.0	88712	98232	66066/20137	414/208	12.50	9521	0	0
K-L	19:02:56.0	19:08:30.0	99299	103475	65697/20024	416/209	12.50	4177	0	0
M-N	19:12:01.0	19:16:47.0	106109	109691	65367/19924	412/207	12.50	3583	0	0
O-P	19:18:51.0	19:21:02.0	111240	112876	65128/19851	407/204	12.50	1637	0	0
Q-R	19:25:10.0	19:27:19.0	115970	117586	65248/19888	419/210	12.50	1617	0	0
J-T	19:29:59.0	19:32:41.0	119589	121609	65175/19865	404/203	12.50	2021	0	0
Q-U	19:36:00.0	19:48:50.0	124101	133722	65431/19943	420/211	12.50	9622	0	0
U-V	19:49:34.0	19:53:14.0	134271	137027	65861/20074	412/207	12.50	2757	0	0

Channel 8 geographically offset 1 sample from all other channels



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